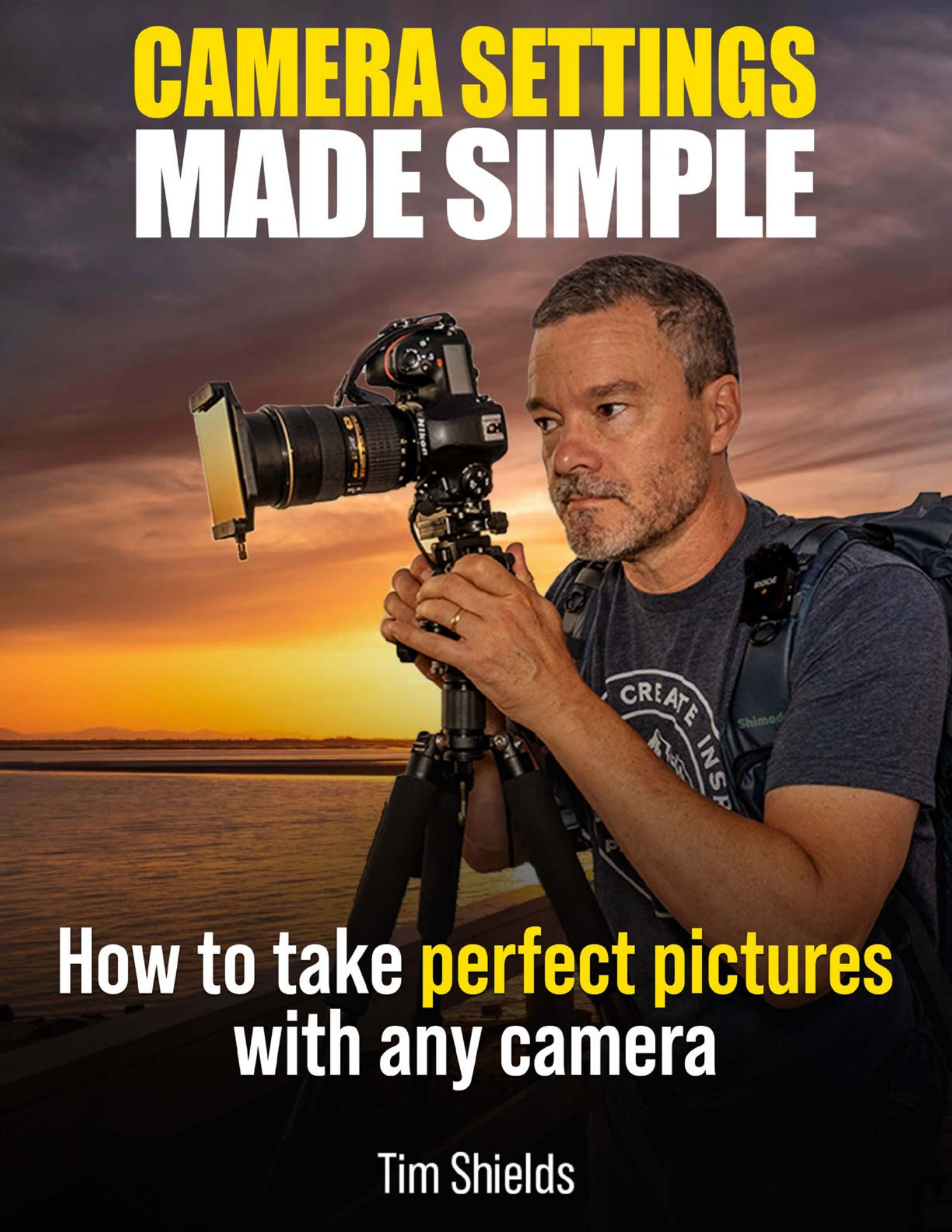
CAMERA SETTINGS MADE SIMPLE



How to take perfect pictures with any camera

Tim Shields

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This guide will teach you my intuitive and easy camera settings system. Notice that both the bright sky and dark foreground are correctly exposed in this photo. You can do this with your photos after reading this book!

CAMERA SETTINGS MADE SIMPLE

The Easy Camera Settings System

Have you ever taken a photograph that you thought would be exceptional? You traveled somewhere, like the edge of Moraine Lake or the Grand Canyon, right when there was the best sunset you ever witnessed.

Then when you make it home (after thinking about how excited you were to make your friends and family jealous) you find out your photos are just a little too blurry, or the sky was pure white?

I almost quit photography because of this exact feeling. I'd been going to some of the greatest locations on Earth, but came home with uninspiring and blurry photographs.

I had to develop a system to allow me to intuitively understand how camera settings work.

When you start working with your camera, there are tens of thousands of possible setting combinations that you can make. Most settings you can set once and forget about. Once you make those changes, there are only three metaphorical levers to pull. This book is going to help you intuitively understand exactly when and where to shift those levers to create perfect, tack-sharp photographs every time.

Because of the many settings options, most new photographers use full auto modes when they're starting out and sometimes the results are more than satisfactory. That means the camera is choosing the settings that it thinks are right for that scene. That can become a problem because the camera does not know the difference between taking a photo of a diving eagle, a landscape, or portraits.

If you are using a tripod to take photos of a landscape, you won't need as fast a shutter speed as you would if you were holding the camera in your hands. The camera doesn't know how it is being held, and its automatic settings may choose a shutter speed that is faster than you need. By doing so, it will use a large aperture (where you lose depth of field) and bump up the ISO to values like ISO 6400 or 12800 (causing noise in the image). The camera will choose settings that create noisy images with unsharp foregrounds when what you actually wanted was to create a long exposure with a long depth of field.

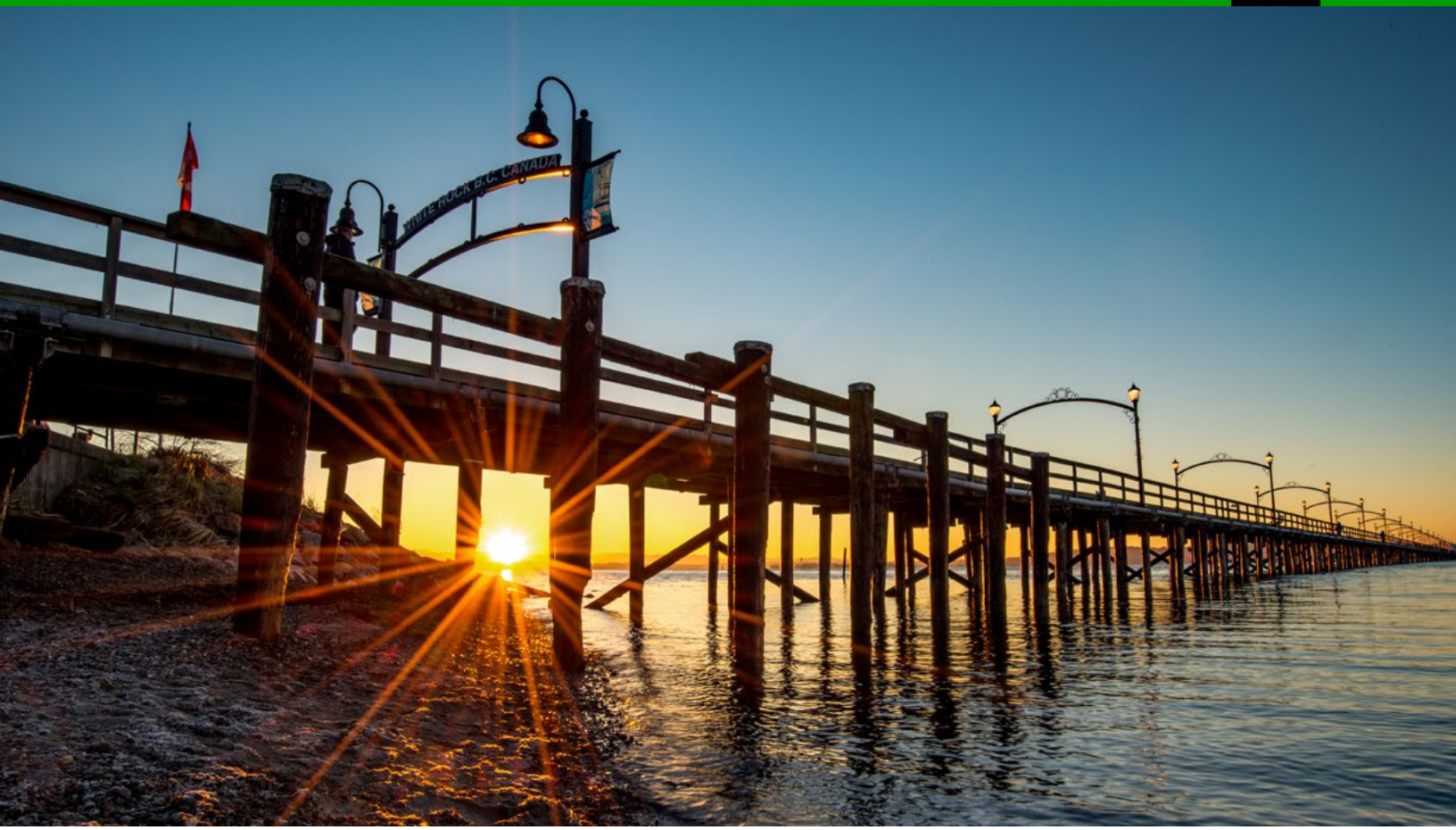
A similar problem occurs when you spot an eagle diving into the water to catch a fish, your camera on auto might think you are taking a photo of the sky. Your camera will make the image dark by using a small aperture. In that case, the sky will be properly exposed with good saturation and contrast in the clouds, but the bird itself will be lost in the shadows.

Worst of all is when you're trying to focus on that bird, and the camera decides to set the focus point on a tree in the background because it thinks the tree is the most important object in the frame, resulting in a useless photo of a blurry bird.

I continuously had problems when I let the camera make all of the decisions for me. When I started taking control by using my simple camera settings system, my photography began to improve dramatically.

In this book, you will intuitively learn everything that I know about camera settings so that you can start focusing on exploring and creating the best photos of your life, and inspiring others with your photography along the way.

Tim Shields,
Founder, Photography Academy



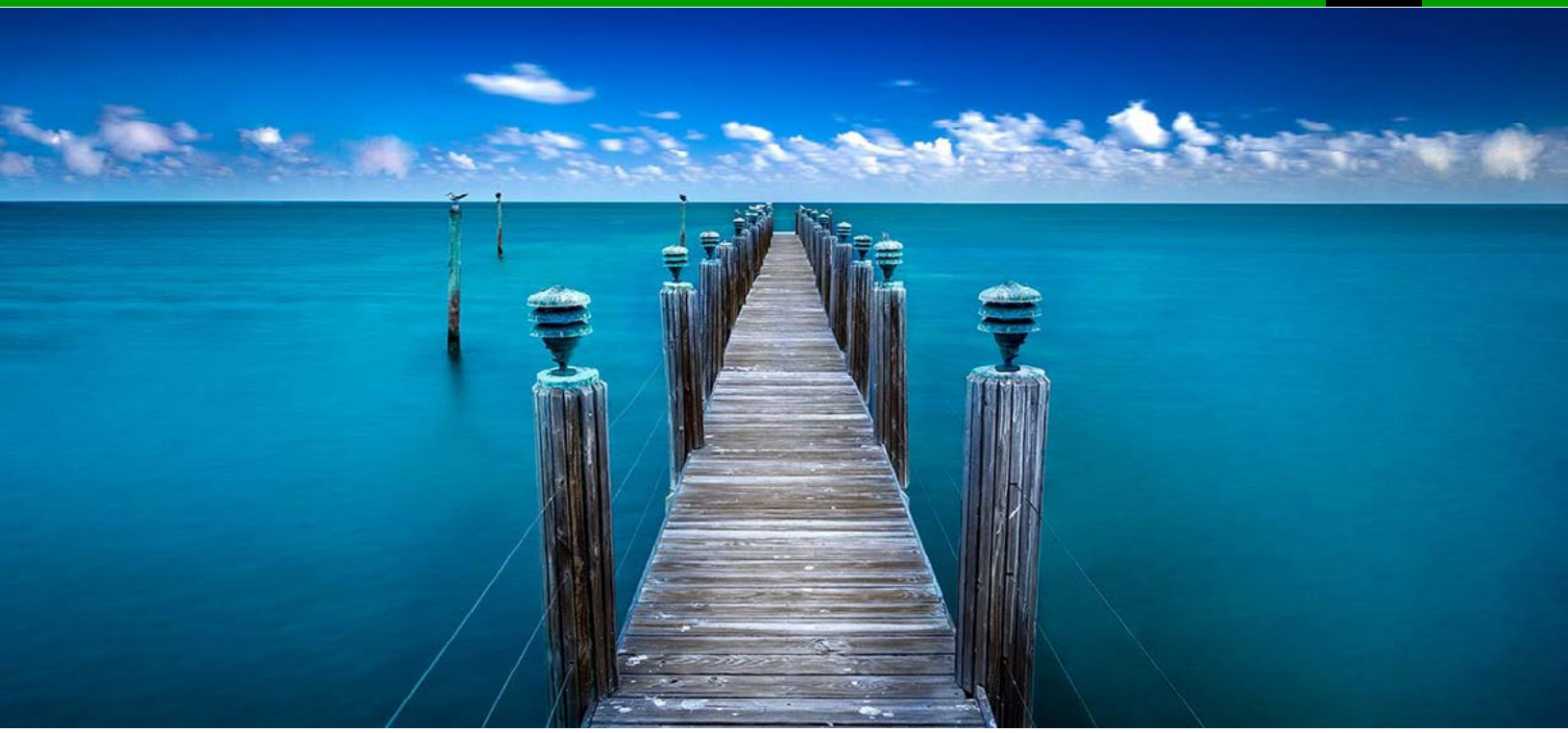
Sunstars like these require an aperture value of f/16.

UNDERSTANDING CAMERA SETTINGS

To understand how to take photos, you have to understand how the main three settings interact with each other to make a proper exposure. These are known as shutter speed, aperture, and ISO.

Each of these metaphorical levers affects how much light is needed to create a perfect exposure. If you push one lever forward, you will need to pull another to maintain the exposure equilibrium.

Every situation will require a different combination of these three settings to get the look you're going for. With a little practice, you will be able to understand how to make those decisions in a snap.



I used a long shutter speed on a tripod to smooth out the ocean waves.

Shutter speed: how long it takes to make the image

Shutter speed is the measure of how long the sensor receives light in a single image. Most digital cameras can shoot between 1/8000 of a second and 30 seconds using a physical mechanism, which consists of two thin metal curtains that slide across the camera sensor, much like a barn door. The smaller the space between the curtains, the faster the shutter speed will be.

Using a slow shutter speed, like 1/30th of a second, will capture more light, because the shutter stays open longer. This creates a 64x brighter image than a fast shutter speed like 1/2000th of a second, which is open for such a brief amount of time that very little light is able to pass through. Any motion that happens during that fraction of a second will be blurry in the image. If you're holding the camera instead of using a tripod, a slow shutter speed can create a blurry image because it's impossible to hold a camera perfectly still in your hands.

A tripod solves the problem of camera shake at low shutter speeds. If you don't have one, you'll need to use the double reciprocal rule. That means using a shutter speed that is at least double the focal length of your lens when you are hand holding the camera. When you are shooting with an 85mm lens, the double reciprocal rule would suggest you use a shutter speed greater than 1/200th of a second (which is the closest shutter speed to 1/170th of a second).

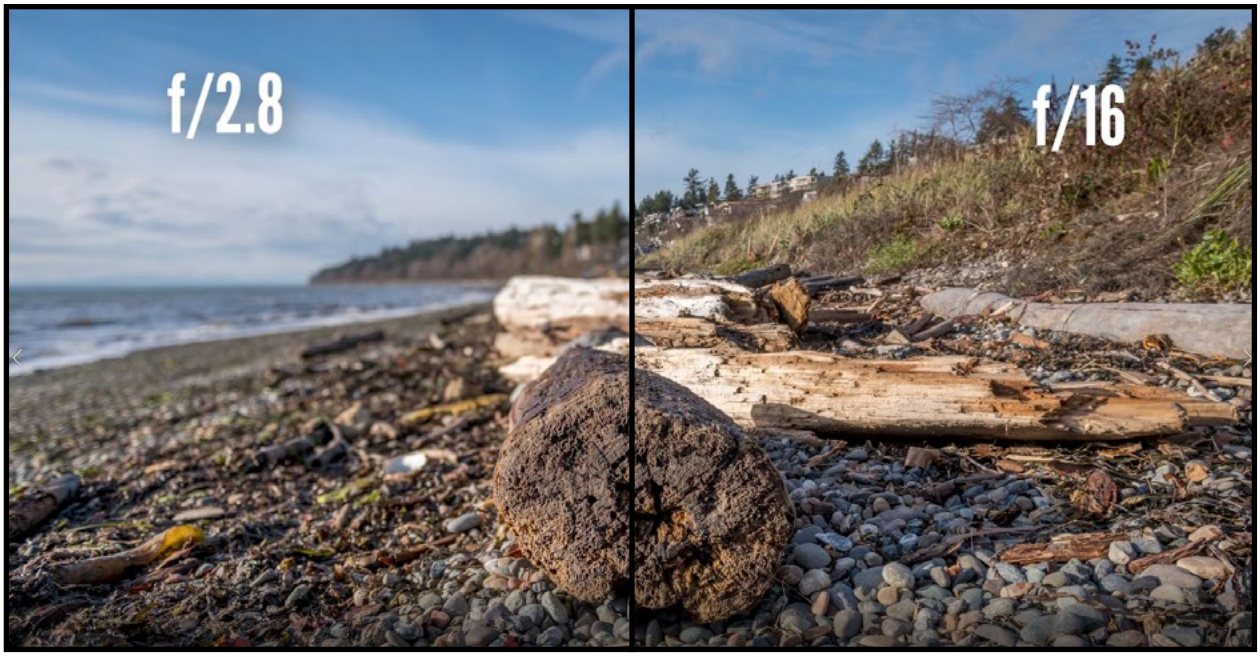
Photographing objects that move fast, like cars, football players, or birds in flight require faster shutter speeds.

Different aperture sizes. Photo by **KoeppiK** on Wikimedia commons.

Aperture: the size of opening light travels through

In a camera, the aperture is an opening that allows light to pass through before it hits the sensor. It spirals open and closed to let in more or less light.

It can be counter-intuitive when you're learning, but the smaller the aperture number, the wider open the aperture is. This means that a f/1.4 is letting in significantly more light than an f/16. The f/1.4 is wide open while the f/16 has been spiralled down to a small pinprick and the f/1.4 has a smaller "in focus" area than the f/16. Landscape, macro, portrait, and product photographers like to use a small aperture (small hole) to get more of the image in focus.

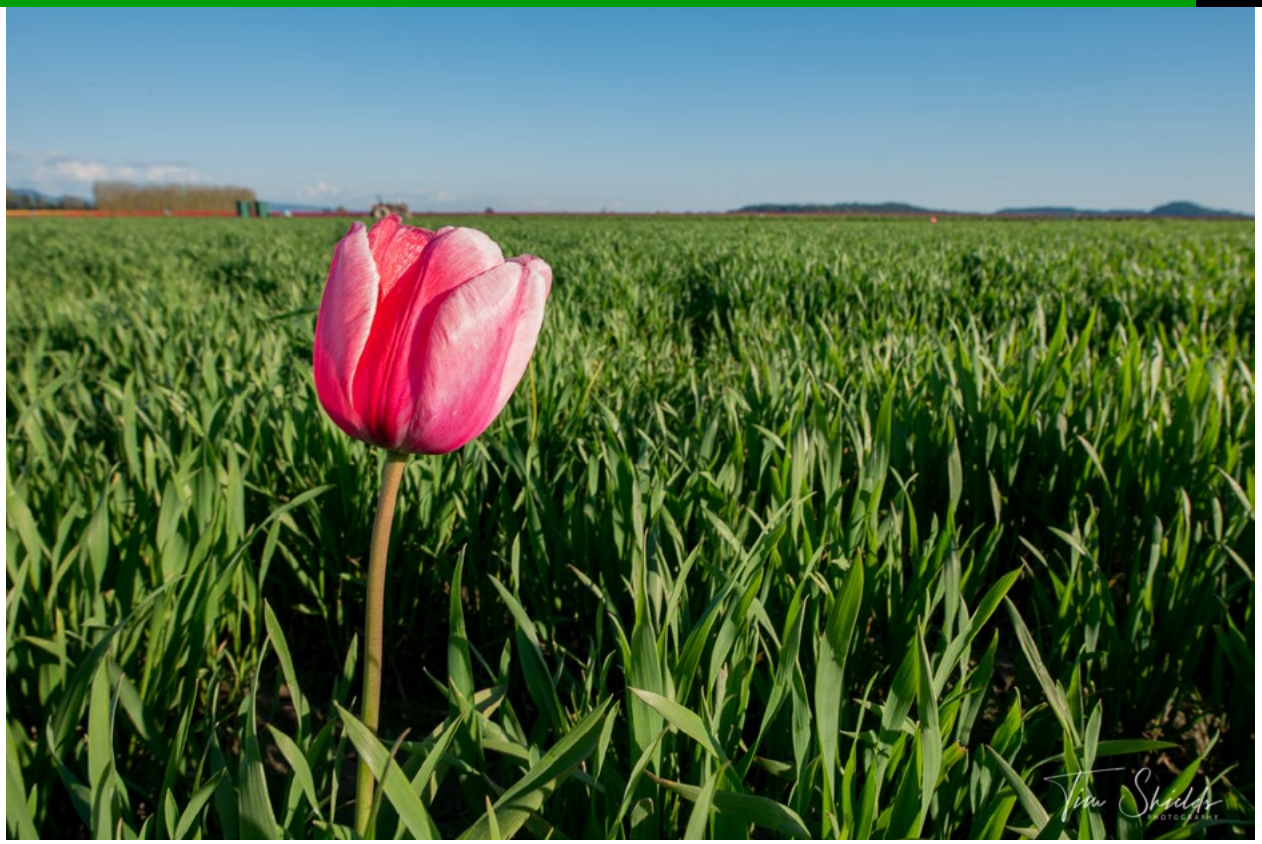


This composition was taken using two different aperture values. On the left, the background is blurry because of the f/2.8 aperture, while it is perfectly sharp at f/16 on the right half.

All lenses have the maximum aperture size value denoted on the lens. Professional zoom lenses will have a maximum value of f/2.8, whereas most entry-level zoom lenses will have aperture values that get smaller when you zoom in with the lens. For example, the standard kit lens for Canon and Nikon lenses is the 18-55 f/3.5 - 5.6.

That means at the wide, 18mm end, the lens has a maximum aperture of f/3.5, but when fully extended, it will become an f/5.6 aperture, which is approximately one-and-a-half-stops darker (but more of the image will remain in focus').

For portrait artists, using a large aperture (small f/#, like f/4 or f/1.8) allows them to blur the background so that all of the focus is on the subject of the image. Landscape photographers like to use small apertures like f/8 or f/16 to get everything in focus from the front to the back of an image.



This photo was shot at f/14, which is normally a small enough aperture to get the entire image in focus. But the background here is out of focus because of how close I was to this tulip with a wide angle lens.

There is another important variable to consider when thinking about aperture. Longer focal length lenses produce shallower depths of field than wide angle lenses at the same aperture value. The only thing that stays true, no matter the distance and lens you use, is the amount of light that the photo sensor receives.

If you're using, for example, a 200mm lens and getting close to the ground, chances are the foreground will be out of focus even if you use an aperture like f/16 to make a larger depth of field. Yet if you took the same image with a 24mm lens, you will likely be able to get that entire image in focus at f/16.

In the situation where you're taking a photo close to the ground with a long lens, you will have to focus stack your images to get the entire image in focus. This is where you take between 5-15 images at different focus points (more will be needed when you get closer to the subject), and then combine those images automatically in Adobe Photoshop (focus stacking cannot be done in Lightroom Classic) to create one image that is focused front to back.

Every lens has an optimal aperture setting where the image will be sharpest.

Aperture and image sharpness

One of the most prevalent myths in photography is that f/8 is the sharpest aperture on every lens, but that's not true. The sharpest aperture is always relative to the lenses' maximum aperture.

For variable zoom lenses with a constant f/2.8 aperture, the lens will create the sharpest images between f/4 and f/5.6. Prime lenses with an f/1.4 or f/1.8 aperture can create the best results around f/2 or f/2.8.

The only time when f/8 will be the sharpest aperture is when shooting with lenses that have a maximum aperture between f/5.6 and f/6.3. That is the case for most large format film camera lenses, which were commonly made between the late 1800s and the mid 1960s — the type photographers like Ansel Adams' would use.

Modern lenses designed for full frame digital cameras (modelled after 35mm film) typically have much larger apertures compared to their focal length.

Lenses also begin to lose sharpness again after f/11. The light is spread so thin by the small aperture that the lightwaves actually begin to interact with each other as they spread before reaching the camera sensor. This interaction leaves images noticeably unsharp along the fine lines — especially after f/22.

I used a high ISO to capture this image at night.

ISO: the photographic gain knob

ISO is the measure of the camera's sensor's sensitivity to light. At a higher ISO number, like ISO 6400, the camera will not have enough light to perfectly expose an image, so it will have to interpret, and boost the signals it receives to produce a properly exposed image.

While sensors are getting better at interpreting an image with low light, there will always be uncorrectable artifacts that are created by using a high ISO value.

Think of it like the gain knob on an electric guitar amp. When a musician turns up the gain, the guitar will sound deep and muddy, like Muddy Waters, The Rolling Stones, or The Who. But if you keep the gain low, the guitar will sound cleaner, almost like an acoustic guitar.

ISO works in the exact same way. Turn up the ISO, and you'll make a gritty, noisy, less detailed image with colored specs throughout. The higher ISO will also reduce the amount of dynamic range, or the amount of details in the highlights and shadows a camera can capture. It will also reduce the overall amount of sharpness. Keep that ISO down, and you'll produce a clean, sharp image with the fullest dynamic range possible.

ISO stands for International Standards Organization. They came up with a standard formula for measuring image sensitivity so that we can all create the same approximate exposures from camera to camera, or film to film in the time it was created. Some manufacturers will fudge the numbers, making the sensors less sensitive at higher values so that their images appear less noisy at the same ISO when compared to other cameras.

Digital camera sensors have become more sensitive over time, but progress is very slow. Since companies like Canon are expected to release new cameras every 2-4 years, there is immense pressure to make the images look like a huge leap forward with each progression.

This is why it is not possible to compare two cameras just on stats and numbers alone.

This photo is sharp because it has no motion blur or inaccurate focus blur.

WHAT MAKES AN IMAGE SHARP?

A sharp photo is one that does not have any motion blur or focus blur. Images can be fixed if they were shot over or underexposed, but the only place for a (unintentionally) blurry photo is in the trash can. So to take photos without any blur, you will need to focus on your settings.

What causes focus blur?

Focus blur is fundamentally caused by incorrect focus technique, or from the camera missing focus altogether. The first type of autofocus blur happens when you or the camera choose the wrong place to focus on. Even if you intentionally set the focus point, the image might still appear blurry because there is another point in the photo that should have been sharp.

This type of focus blur happens all the time when photographers are starting out and playing with shallow depths of field. Using the largest aperture possible, that shallow depth of field will make one part of the image stand out. But if you choose the wrong part of the frame, the image will just appear blurry.

The second cause of focus blur is when the camera misses focus. Many entry-level cameras aren't as smart as their professional counterparts. So they may end up being unable to focus accurately — especially when the subject is moving or when it's dark.

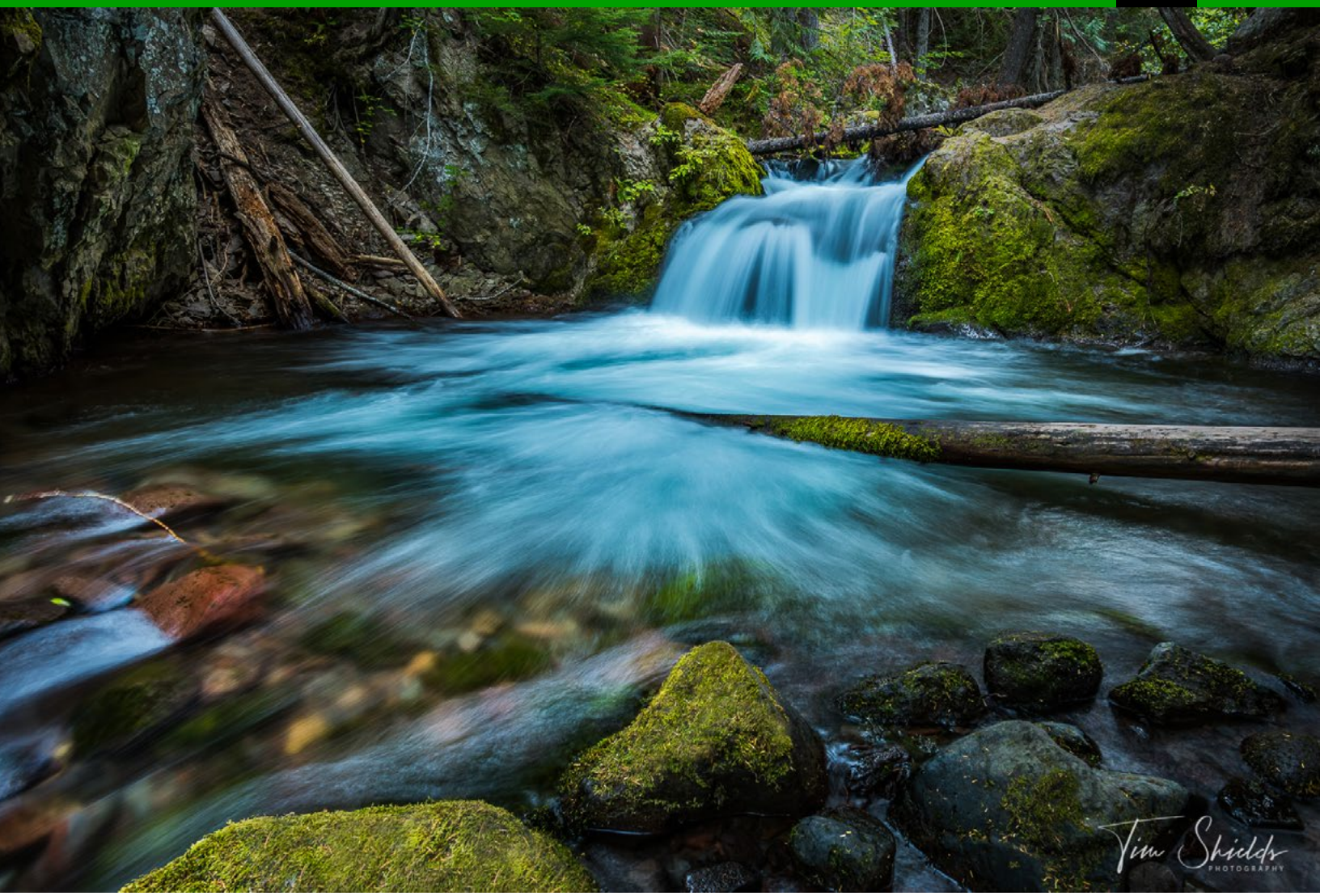
The last cause of focus blur can be created by the lens itself. When this happens, the lens might be focusing slightly in front or behind where the focus point should be. If you find your lens is consistently focusing behind or in front of where it should be, then it will require calibration.

While most name-brand lenses are calibrated to high standards, some of the third party lenses will require some fine tuning to get them to focus just right with a DSLR camera. Mirrorless cameras do not need calibration because they use the camera sensor to focus the image, while DSLRs have a dedicated distance sensor that sits in front of the normal sensor.

This type of calibration can happen with a focus chart, like the **SpyderLensCal**, or by using household items and taking photos using the largest aperture value on your lens at the closest focus location, and then at the closest distance marker to the infinity autofocus point. If you're using a wide angle lens, the furthest distance marker before infinity may be only five meters away, while on a telephoto lens, (like a 70-200mm lens), the furthest distance marker may be 30 meters away.

Review the photos in Lightroom Classic, and see if the camera is focusing in front or behind the object just slightly. If that's the case then go into the Autofocus Microadjustment (Canon), or AF Finetune (Nikon) setting on your camera, and increase or decrease the values and retest until the autofocus is spot on.

The process can take anywhere from an hour to an entire afternoon depending on how many lenses you have to calibrate. Using a lens calibration tool, like the SpyderLensCal above will show you the exact changes to make in your camera's settings, making the process faster and more consistent.



This image uses motion blur creatively to reduce the texture in the water.

What causes motion blur?

Motion blur is caused by using a shutter speed that is too slow. The camera sensor will capture any motion that happens in front of it. Motion blur can ruin a photo, whether it is caused by the user moving the camera, or from birds moving too fast across the frame. The easiest way to fix motion blur is to use a faster shutter speed.

The general rule to reduce motion blur in your images is to use a shutter speed that is twice the focal length of your lens. That means if you are shooting with a 50mm lens, you will need a shutter speed faster than 1/100th of a second to create a sharp, motion-blur image. Shaky hands and fast moving subjects (like when photographing athletes or wildlife) will require shutter speeds that are faster than the double reciprocal rule.

If you're unable to get a shutter speed that is twice as fast as your focal length, you will need to make a few adjustments to your settings.

Option 1: Use a tripod. A tripod is the best tool in a landscape photographer's kit. They are essential for taking images with shutter speeds longer than the double reciprocal rule (using a shutter speed that is twice your focal length) would allow. This might occur when taking long exposures that blur clouds and water. Tripods are also useful for taking panoramas and HDR images. The downside is that tripods are usually heavy, and they can't stop motion blur on subjects that move fast.

Option 2: Increase your ISO, lower your aperture. If you can't bring a tripod with you, or if you're photographing fast moving subjects, you will need to adjust your settings to compensate for capturing less light with a faster shutter speed. This becomes much harder in low light, where image quality is limited by the physical capabilities of the lens, requiring the user to increase their ISO sensitivity to compensate. How far you're willing to increase your ISO is a personal choice.

Some cameras can create almost perfect images even at ISO 3200, where others will start to become overly grainy at ISO 800. The only way to know for sure is to test your camera in different situations. For example, noise will be more distracting in the shadows than it will be in the highlights.

What camera settings do you need to take an image like this?

HOW TO CHOOSE THE RIGHT SETTINGS EVERY TIME

The best thing you can do for your photography is to learn how to use the right settings for the right situation.

Being able to shoot in manual mode and understanding when to use automatic exposure modes will make you a better photographer. You'll understand how to move and change the settings in seconds to adapt to new situations, and you'll know how to come home with the tack sharp images every time.

Images with this much dynamic range (the amount of variance in light from highlights to shadows) require practice to get right.

EXPOSING YOUR IMAGES PROPERLY

When you first start taking photos in manual and semi-automatic modes, you're going to run into errors with exposure. That's just a given with photography in general. It's hard to get the perfect exposure in all circumstances without a bit of trial and error. In fact, nearly every digital photographer suggests taking a test shot to review and tweak the exposure in the field.

But there are a few key tips that will help you get closer to perfect every time. In this section, we're going to go over all of the automatic modes so that you can start to understand how they affect your image and when to use them for the best effect.

Getting the right exposure at night requires careful spot metering so that you expose for the right part of the image.

METERING MODES

All DSLR and mirrorless cameras can meter the image exposure using a number of different methods. Some of them are designed to create the overall best exposure, while others measure for a specific part of the image. The most common metering modes, and the ones we'll explore in this section are spot, evaluative, and center-weighted average metering methods.

Spot metering: A metering mode that calculates the proper exposure based on a small portion of the frame, usually where your focus point is in the image. If you want to ensure that a single point of the frame is exposed correctly, like a face, or a shaded area, you'll want to use this metering mode.

The downside of spot metering is that it is not a good mode for people who like to passively choose their exposure. If you don't set the focal point to the exact place you want to meter, you may be exposing incorrectly for the scene as a whole.

Evaluative metering: The standard metering method used on all cameras. Evaluative metering looks at the scene as a whole and determines the best overall exposure. Evaluative metering works great in most situations, but it fails to produce proper exposures in high-contrast scenes where you'll want one part of the image exposed properly, while sacrificing another

For example, evaluative metering won't work well when photographing birds in flight. Since the sky will be much brighter and larger than the bottom side of the bird, the meter will expose for the highlights, making the bird darker than it should be.

Center-weighted average: A metering mode that works like evaluative metering, but only looks at the center of the frame. Center-weighted average metering works well when photographing your subject is in the center of the frame, or when photographing landscapes.

In my personal experience, spot metering is the only way that I meter my images. It works the best for my needs when photographing landscapes as well as wildlife, because I'm always placing the focus point on the subject that I want to be exposed properly. There are other times when the other methods could work better, but by keeping my metering mode on spot metering means I never have to change this in the heat of the moment, or miss shots because I forgot to change it.

The last thing you're able to do when photographing animals is to change a simple mode like metering. There just isn't enough time. So by limiting the options that I can change, I can keep my mind focused on the task at hand.

Next we're going to talk about how to use automatic exposure modes, and what to do when it's impossible to capture all of the detail when the sky is too bright, and the shadows are too deep.

Would you expose this image for the bright parts, or for the shadows?

Automatic exposure modes explained

When you have to make decisions manually, you will have less time to focus on composition and all of the other factors that make a good photo. That's why I do use some automatic modes to reduce the sheer number of decisions that I need to make.

There are three main options for automatic modes: full auto, shutter speed priority, and aperture priority.

Full auto: This option is usually denoted by the green square on the mode dial and will choose the shutter speed, aperture, and ISO for you. Full auto will work in many cases, but it will choose the wrong settings often enough to be unreliable. I don't ever recommend using the full-auto exposure mode.

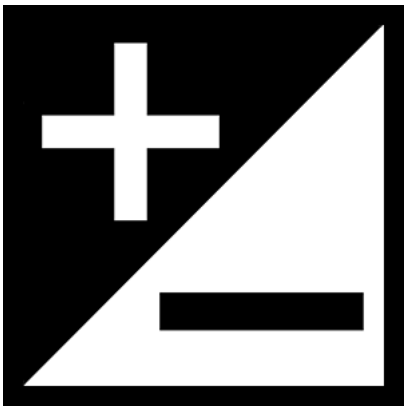
Shutter speed priority: Denoted by the S on the mode dial, this setting allows the user to set their shutter speed, and have the camera choose either the aperture, or the aperture and ISO depending on your camera. Shutter priority mode can be useful when shooting sports, wildlife, and other types of action photography that happen in variable light.

Aperture priority: Denoted by the A on the mode dial. This is my favorite automatic mode. As a landscape photographer who uses a tripod, aperture is far more important for me to set than shutter speed. By using this setting on a tripod with my ISO locked in at 100, I can get perfectly sharp photos front to back no matter the lighting in front of my camera. It will choose the shutter speed to match so that there is one less setting for me to decide on.

Some photographers also use automatic ISO. This setting isn't on the dial on top of the camera, and is usually found when changing the ISO on your camera. There are compositions where you'll need control over the aperture and shutter speed, but won't have time to change the settings when you're taking the photo. For example, when a bird flies overhead, you might only have a couple of seconds to capture that image. If you have to fiddle with the settings to get a correct exposure, you'll miss that shot. In that case, I always use auto ISO with a fast shutter speed and an open aperture.

Exposing a scene like this is incredibly hard for a camera to do automatically. It will always try to make the bright, reflective snow appear grey.

How to use exposure compensation



Most of the time, the camera will do a great job at metering automatically, but there are certain conditions where the camera's best guess is going to be way off. The classic example is taking photos on a snowy day. That white surface will make the camera severely underexpose the image in order to make the white appear a neutral color.

Exposure compensation tells the camera to over or underexpose the image. For example, in the snow, you would want the camera to intentionally overexpose the image by +1 or +2 stops, depending on how much light the snow is reflecting.

Usually, you'll need to make test exposures to dial in the perfect settings. The same also happens for photos of birds in flight, where the camera will expose the image for the sky, making the bird appear almost completely black in the frame.

As well, there are cases where the camera tries to make black objects middle grey. For example, if you're shooting portraits with a thin beam of light around a black background, certain metering modes will attempt to evenly expose the entire image. In that case, you'll need to turn the exposure compensation down to -1 or -2 stops to tell the camera that you want the blacks to remain black.

Note: Exposure compensation only works when using automatic exposure modes. If you're shooting in manual, exposure compensation will not have an effect. Some cameras have exposure compensation built into the dials or buttons on top of the camera, while others will have it in the settings that you see when you press 'Q' on the back of the camera.

Difficult lighting scenarios may require manual exposure.

When should I use manual mode?

Many professional photographers rely on semi-automatic modes because of their reliability — especially portrait or wildlife photographers who are working in conditions that change constantly. If the action is happening fast, you want a camera mode that can change settings faster than you can.

There are some cases where the only way to go is manual. For example, if you're taking a panorama on a tripod, you need to ensure all images in your set come back with the exact same exposure — even if that means some images appear bright and others appear dark. Otherwise, you will end up creating panoramas of patches of different exposures which will be hard to fix in post production.

Other forms of photography that require manual settings are astrophotography and night photography. If the majority of the scene is dark, it will be hard for a camera to expose the image without blowing out the highlights. The image of the White Rock Pier above required me to use manual exposure for this exact reason.

Manual mode is also great for people who want to have complete control over the settings. For example, if you want to over or underexpose your images intentionally, you will need to use manual settings to make those decisions quickly. It all depends on your comfort and understanding of the camera. Every photographer is different, so it will take practice to find what works best for you.

The same image exposed for different parts of the image. The image on the left is exposed for the shadows and the sunset is unrecoverable. The image on the right is exposed for the highlights but the shadows will be grainy. The middle image is a good representation of the entire spectrum and will be recoverable.

Expose for the Highlights

Digital cameras can capture more dynamic range now than ever before. The top of the line DSLR and mirrorless cameras are able to capture almost as much dynamic range as the human eye (or more than the human eye when using HDR techniques explained below).

There is a limit to the amount of data that can be captured. For example, there will always be more color information captured in the middle of the histogram than on the left or right sides.

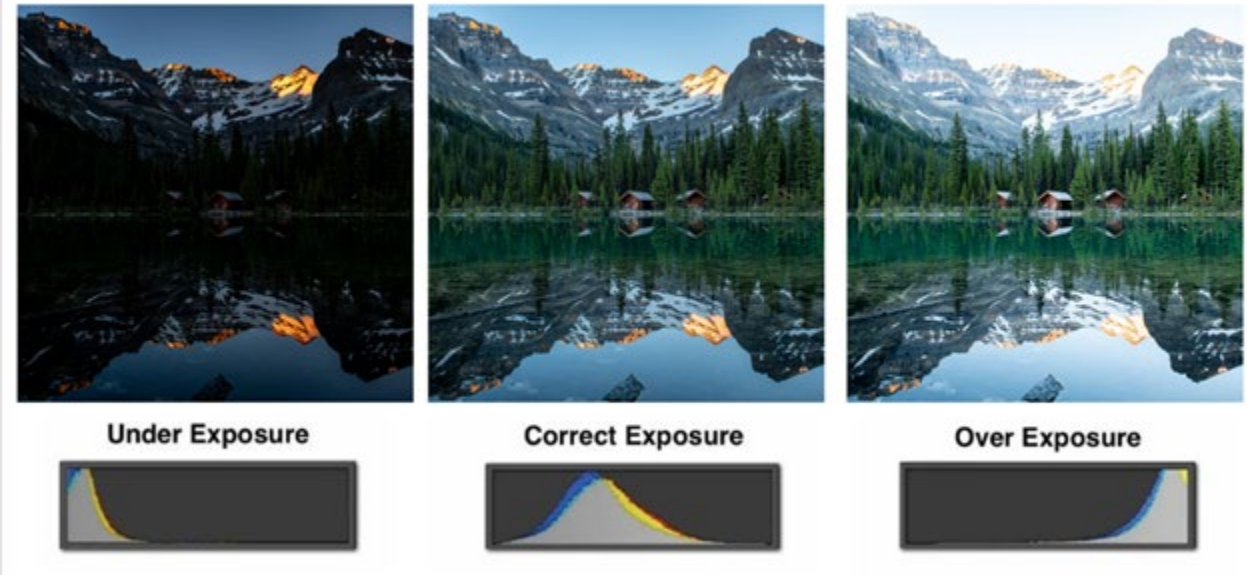
Photographic information can be explained by looking at the range of an image. If you pull up the shadows, the areas that are brightened the most will become grainy because Lightroom Classic has to guess what's there based on the limited amount of light information.

The middle exposure image from above with the highlights all the way down and the shadows up in Lightroom Classic. This represents all the information captured, yet the highlight colors in the sky are still not as saturated as the image exposed for the sky.

In the highlights, you'll notice that the brightest areas will become less saturated with color. When you make the bright parts darker by pulling the highlights slider to the left, you can never make them as saturated as they would be by increasing your shutter speed in the field to capture the bright spots in the middle of the histogram.

Both of these effects — the grainy shadows and the desaturated highlights — happen because there is less information captured at the extreme ends of the dynamic range spectrum. The problem gets worse with entry level cameras or when you increase the camera's ISO.

Digital cameras are better at interpreting the information captured in the shadows. That's why the common advice given to digital photographers is to expose for the highlights, which means to lower the exposure so that the brightest parts of the image are not clipping past the right side of the histogram. When that happens, there will be no way to recover the information that was too bright.



The histogram is an easy tool to help visualize exposure on the back of the camera. If it's too far to the right, the image will be overexposed. Too far to the left, and it'll be underexposed. The perfect exposures will be mostly in the middle of the graph.

Reading the histogram

The histogram is the best way to know if you have the right exposure for your scene. Every digital camera can show a histogram and Lightroom Classic displays one prominently on the top right side of the develop module.

The histogram is that curved graph that displays where the information is captured in your photograph. If the graph shows higher curves in the center of the histogram, then the resulting image will be properly exposed. If the peaks are hugged against the left side, then the image will be mostly underexposed, or overexposed when the peaks hug the right side.

The histogram can tell you everything about your exposure in ways that you won't be able to see in an image displayed on a small LCD screen, but the histogram makes that information instantly readable.

You'll need to use the histogram to ensure that your image doesn't have pure black shadows or blown out skies.

Once that information is lost, it cannot be recovered in post production. So it's important to know you're getting the right exposure when you take the image, rather than when you get home and load it onto your computer.

This is an HDR image created from the three exposure settings above.

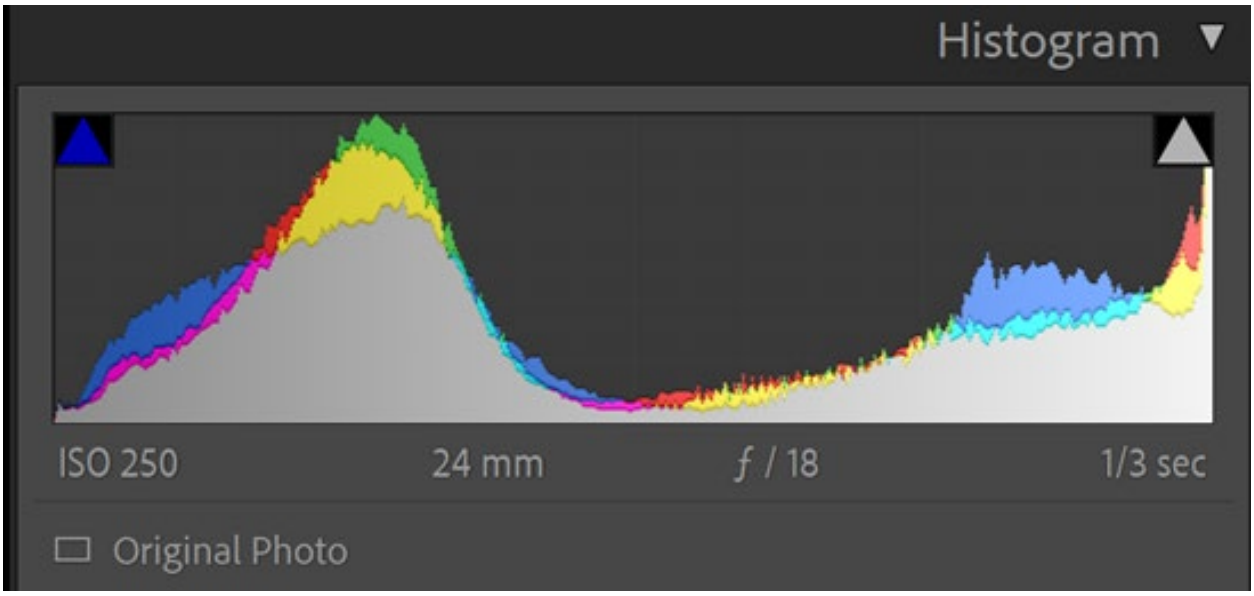
When should I make an HDR image?

Have you ever taken a photo of a sunset, only to find the sky doesn't look as good as it did when you saw it with your eyes? Cameras cannot capture as much dynamic range as our eyes can, so the sunset will look less vibrant because it is over exposed.

Or, if you properly expose the sky, all of the foreground can become silhouetted. Even top-of-the-line cameras will lose some details or colors when the highlights and shadows are incorrectly exposed.

When this happens, the only way to capture everything is to combine multiple exposures into a single image using HDR photography.

HDR means High Dynamic Range. HDR is a technique that combines multiple exposures taken on a tripod in Lightroom Classic or Photoshop into a single image with the best parts of each exposure. I typically expose three images. The first image is properly exposed for most of the image — the way you would normally take a photo with a single exposure. The second photo will be two stops overexposed to capture details in the shadows and the third shot will be two stops underexposed to capture details in the highlights.



The histogram from an overexposed image. The peaking on the right side of the histogram shows that there is a large portion of the image that was overexposed, and that it will be a good candidate for an HDR.

One way to tell if you need to use HDR is to look at the histogram. If you see that there are peaks on the left and right side of the histogram, then you know that there is a lot of variation in the light. When there is that variation, you will be losing detail by capturing only a single exposure.

Just be aware that HDR photos will look flat and boring at the start. To get the most out of an HDR photograph, you will have to edit back some of the contrast to make the image pop.

A tripod will allow you to take the kind of photos that win awards.

When do you need a tripod?

Tripods are the single most important tool for landscape photography. The tripod is what allows a photographer to capture a perfectly sharp image when using slow shutter speeds.

Since landscape photographers often want to create sharp images with large depths of field and the lowest ISO settings possible, a tripod is necessary most of the time.

Tripods are needed every time you take an image with a shutter speed less than double the focal length of your lens. For example, if you need to use a shutter speed that is slower than 170th of a second when using an 85mm lens, you will need to use a tripod to create a sharp image without camera shake.

Tripods are also necessary for creating panoramas and HDR photographs, where the stability and precision will allow you to combine the photos to make a single image.

In these cases, even if you have a faster shutter speed, you will not be able to perfectly align the images if they are hand held. The smallest movements to the left and right can completely change the image — especially when using a wide angle lens.

What autofocus mode would you need to capture this image?

CHOOSING THE RIGHT AUTOFOCUS MODE

Autofocus mode is how the camera focuses, whereas the autofocus point (described below) is where the camera focuses. Autofocusing modes can be confusing and, when used improperly, can be the cause of out of focus images. Every mode has its own unique benefits and drawbacks. Most photographers choose one mode that they like the most and stick with it. It is better to get to know the quirks of an autofocusing mode rather than getting stuck trying to change it when you need to be using something different.

AF-C (Continuous Focus)

This autofocus mode continues to track your subject, by analyzing a moving subject and predicting where to focus as the subject moves across the frame. Some cameras can move the focus point automatically to track a subject, while older models continuously focus on the one autofocus point, leading the photographer to move that point with their subject. Continuous autofocus is the perfect mode for taking photos of sports, wildlife, portraits, and any other circumstance where the camera and subject are moving.

AF-S (Single Focus)

This autofocus mode focuses on your subject once, locks it in, and does not track focus until you press the autofocus button a second time. Single focus is useful when you're taking photos on a tripod, or taking photos of subjects that aren't moving, as tracking modes may suddenly change the focus point when you don't want them to.

AI-Focus (Hybrid)

This is a hybrid focusing mode that is supposed to use the best of both worlds. It continuously tracks moving subjects until they stop moving, when it will lock in the focus point. It's typically known for being unreliable, though. If you need to track a subject, you're better off using continuous autofocus modes.

I have kept my camera in AF-C for as long as I've known how to really use one, because that is the mode I find the most useful. Even though it's not the best mode when you're on a tripod, it does a good enough job that I've never had to worry about it. Plus, it also has flexibility so if I find myself tracking wildlife – like birds – I don't have to think about changing this setting before taking the photo. If I ended up using AF-S when an owl takes off, I'd miss every shot. Keeping my camera in AF-C reduces the amount of choices I have to make every time I take a photo, which reduces the chances of messing up.

Some of the more advanced cameras will also have different continuous autofocus modes and settings found deeper within the camera settings. Some of these modes are better than others for tracking objects forward to back, while others may be better for side to side action. These modes may make your continuous autofocus work better depending on what types of events you're shooting. Since every manufacturer is different, the best way to find out how these continuous autofocus modes work is to consult the camera manual.

Back button focusing makes shots like this much easier to achieve.

Why you should use back button autofocus

Have you ever worked so hard to get the right focus, but then you go to take the photo and the camera starts hunting for focus again? If you're a macro, product, or landscape photographer, this has absolutely happened to you at least once before.

The solution to this problem is to untether the autofocus from the default half-shutter press, and to set up back button autofocus. This way a different button on the back of the camera will turn on the autofocus so that you don't have focus every time you take a photo.

Setting this up will be different on every single camera, but changing that setting will make photography much easier.

For this image, I pre-focused 1/3rd into the image to ensure everything was in focus from foreground to background.

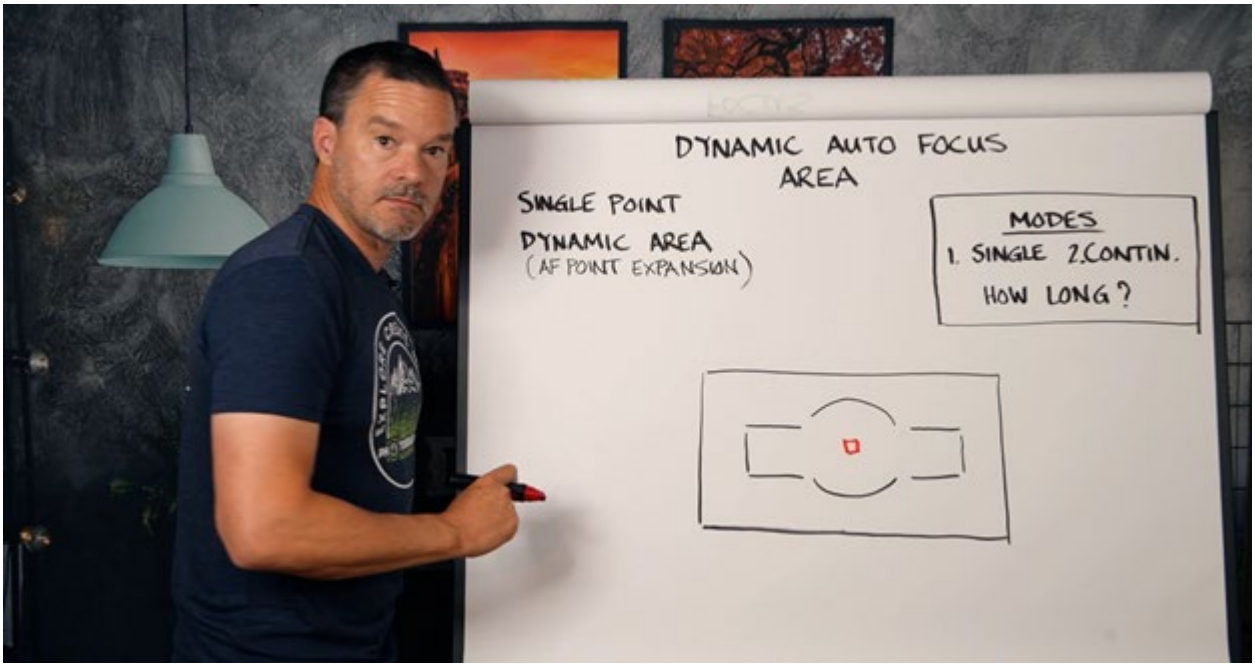
USING THE RIGHT AUTO FOCUS POINT

The most important setting for taking good photos is to select your own autofocus point, which tells the camera how to focus on the subject. If you let the camera choose the point for you, it will make the wrong decision nine times out of 10. Even if you're shooting landscapes, you have to choose the autofocus point in the camera to ensure that you're getting the photo in focus.

There are three main autofocus types that every camera is capable of using, as well as how and when to use them. Here's an overview of the basic focus point selection modes that are available on every camera.

Auto focus (AF) point selection

This is the default setting when you first turn your camera on. Auto focus point selection will let the camera choose what it thinks is the ideal point of focus. Most mirrorless cameras will be able to pick out people or eyes, while DSLRs will simply choose the point of highest contrast, meaning in the majority of cases, auto focus point selection will not choose the right focus point. That's why I always turn this setting off as soon as I pick up a camera.

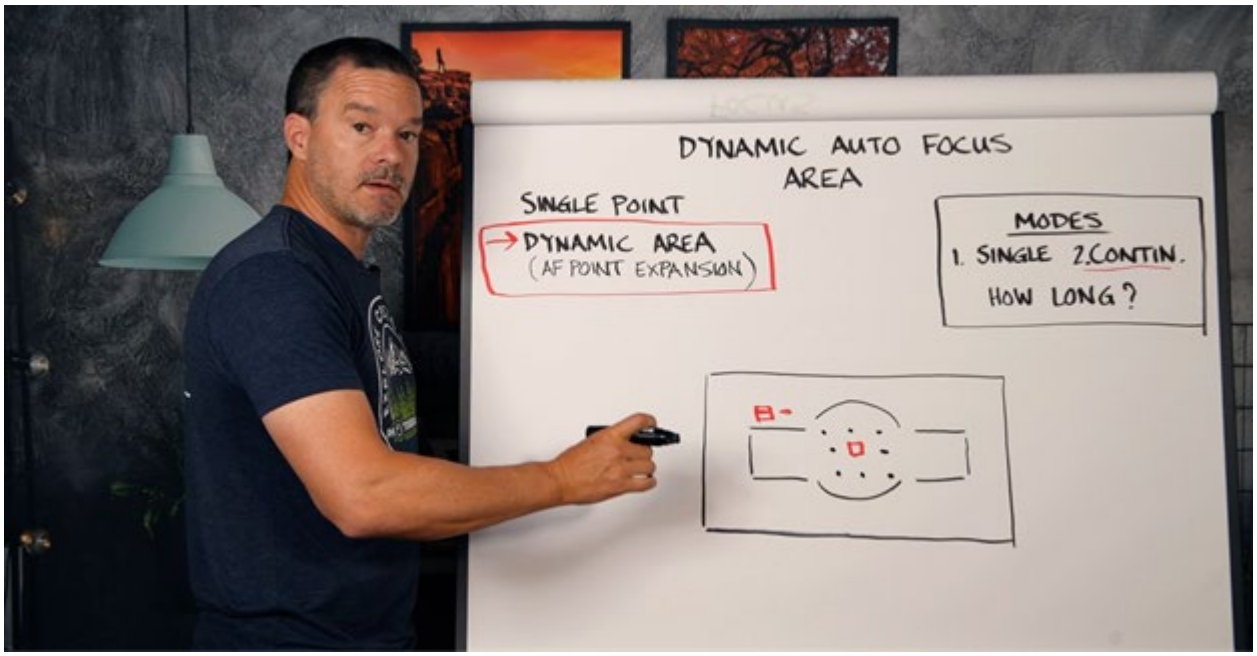


Tim Shields teaches the different autofocus modes. If the rectangle is your viewfinder, the red dot represents single point AF.

Single point AF

Single point AF is the setting that allows the user to manually select the individual focus point where they would like the camera to focus. This is the most precise autofocus mode that professionals use to target an exact location — whether that be the subject's eye, or a specific point of interest in the frame.

Single point AF is the most time consuming mode to use, but it is also the most accurate. The autofocus points in the center of the frame are always more accurate than the autofocus points on the edges of the frame. Try to use the autofocus points in the middle as much as possible when taking photos of moving subjects.



A representation of expanded point AF, also called dynamic area on some cameras.

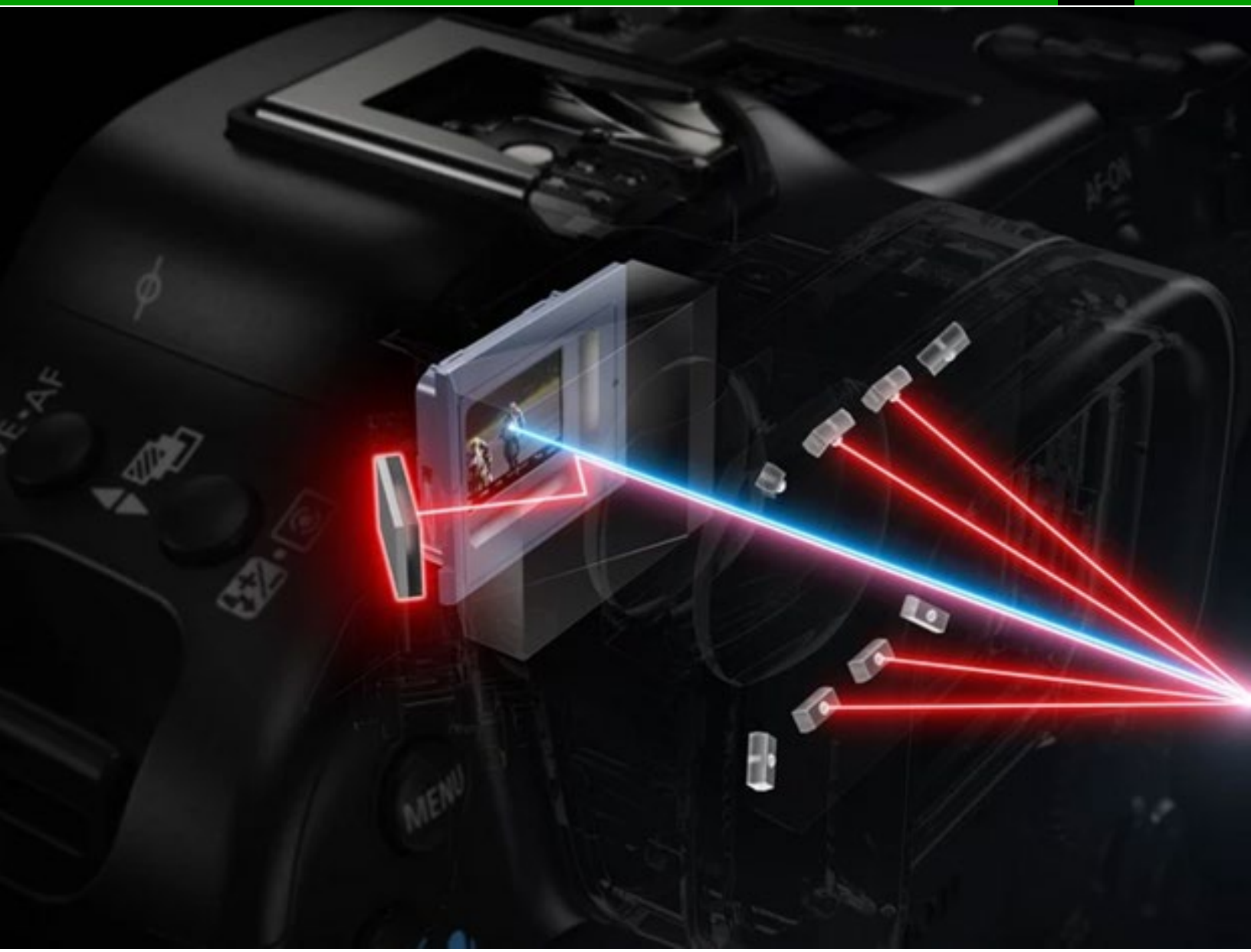
Expanded point AF

Expanded point AF targets a region of autofocus points in a similar way as single point AF. The camera will automatically choose what it thinks is the best location within that smaller area.

Expanded point is useful for tracking subjects, as it gives the camera leeway to switch focus points if the subject or the frame moves. Many cameras can switch autofocus points in single point as well, but may require a settings change in the menu system to allow it.

Eye AF

Eye AF is a new feature that exists primarily on mirrorless cameras that finds and focuses directly on the subject's eyes. Mirrorless cameras use the entire camera sensor to focus, giving them more information to work with. When it works (some cameras are better than others), eye AF is a dream come true for portrait photographers. Some cameras can even track the eyes of animals using this focusing mode. DSLR cameras, however, are not capable of eye AF at the moment.



Canon's eye control AF uses infrared sensors to determine where the eye is looking. This new system supposedly works even for users with glasses. Image by Canon for the EOS R3.

Canon's eye control AF

This is the most niche AF mode that exists. To date, Canon is the only manufacturer that has ever been brave enough to put this in their cameras. Eye control AF uses a sensor in the viewfinder to see where your eye is looking in an image and automatically chooses the closest autofocus point.

If it works, this setting means you will have full control over the focus of an image without ever having to dial in the focus point with your hands. It could be a gamechanger for sports, wedding, event, and wildlife photographers.

Most surprisingly, eye control AF existed in cameras before the first consumer digital camera was ever created. Right now, eye controlled AF is only available in their R3 mirrorless camera but Canon first released this feature in their 1992 EOS 5 camera, which was a prosumer 35mm film camera. It apparently worked great for people who didn't have glasses.

The new eye control AF system uses the latest advancements from Canon's medical imaging sector to understand exactly where a user is looking based on a number of infrared sensors placed around the electronic viewfinder. This system is supposed to work even for users wearing glasses and contact lenses.

Landscape photography is all about using high apertures, low ISOs, and long shutter speeds.

CAMERA SETTINGS FOR LANDSCAPE PHOTOGRAPHY

The primary motive is to create images that are as sharp as possible, while capturing the most amount of detail. That means using low ISOs and large apertures.

To get those desired settings you will almost always have to use a shutter speed that is less than double the focal length of your lens. That means a tripod is necessary for almost every shot that you will take.

Of course, it is possible to take images with a larger aperture and a higher ISO to use a fast shutter speed. If you don't have any elements in the foreground, you can focus at infinity and use an aperture value between f/4 and f/8 to take a sharp image hand held.

Anytime you have a foreground element that you want in focus with the background, you will need to use that small aperture to capture a large depth of field.

The maximum possible depth of field (or area of sharp focus) within a single exposure is called the hyperfocal distance, which photographers find using a simple technique.

To get everything in focus front to back in an image like this, you will need to use the hyperfocal distance

How to find the hyperfocal distance

Finding the hyperfocal distance is a fairly straightforward task that works very well with wide angle lenses, but there is a caveat. While everything within the hyperfocal distance will be acceptably sharp, it will not be perfectly sharp.

Acceptably sharp means that when you're looking at a printed photograph, you won't notice that it is unsharp. But if you zoom in 200% or further in Lightroom Classic, you will notice that it isn't quite tack sharp. To get an image tack sharp, you'll need to use focus stacking.

To get the hyperfocal distance you will need to set your camera on a tripod, and use f/16, ISO 100, and whatever shutter speed is necessary. Then measure the distance from your lens to the closest subject in the foreground. If your lens has a distance marker, you can focus on the foreground element and read the distance off the lens. Then, simply multiply the distance by two and focus that distance away.

For example, if the closest foreground element is five meters away, you will focus your lens at 10 meters, and using an aperture value of f/16, you will be able to capture everything acceptably sharp.

Where this recipe breaks down is if you get closer to the foreground element, or if you use a long telephoto lens. Because of the rules of optical physics, 35mm lenses or wider will create noticeably sharper images using this hyperfocal distance method than lenses that are longer than 50mm.

This image in Valensole, France was taken with a 100mm lens.
Only the foreground in this image is in focus, so it requires focus stacking.

When to focus stack your images

When using the hyperfocal distance we're able to make acceptably sharp images front to back, while focus stacking makes it possible to capture images that are perfectly sharp front to back — even with a telephoto lens. Focus stacking works by taking multiple images at different focus points and combining them automatically in Photoshop or other programs that are dedicated to the task.

Start by focusing on the closest foreground element at an aperture between f/8 and f/16. Take the picture, then move the focus point back until you see the first focus point start to get out of focus. At the beginning, you will move the focus just a little bit, gradually making bigger jumps until you take your final image focused at infinity.

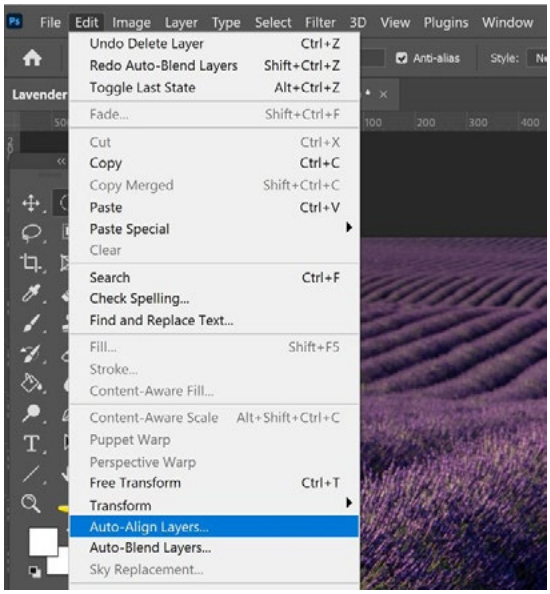
The longer focal length the lens is, the more photos you will have to take. It is not uncommon to combine 10 or more photos to create a tack-sharp landscape image front to back with a long telephoto lens, like a 200mm lens.

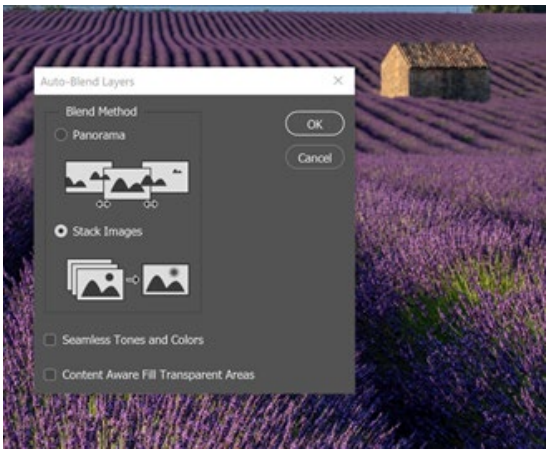
The image after focus stacking in Adobe Photoshop.

How to stack your images in Photoshop

Then when you bring the photos into Lightroom Classic, select all of the focus stacking images, **right click**, and mouse over the option **Edit In**, and choose **Open as Layers in Photoshop**.

Once they are open, **select all the layers**, go to the **Edit menu**, and choose **Auto Align Layers**. That way if any frame is slightly off center from the others, it will not cause the entire image to become unsharp.





Next, while all layers are selected, go back to the **Edit menu**, and choose **Auto-Blend Layers**. Next, choose the **Stack Images** option and click okay.

Make sure the **Content Aware Fill Transparent Areas** and **Seamless Tones and Colors** boxes at the bottom of the window are unchecked, as these can create strange patches of generated content within the image.

Then, Photoshop will chew on the problem for a minute, before spitting out an image that is perfectly in focus from front to back.

This is what happens when you stack six hours of 30-second star photos.

CAMERA SETTINGS FOR NIGHT PHOTOGRAPHY

Night photography is all about capturing the available light. It's one of the most difficult mediums, because it requires manual settings and a tripod to capture sharp images.

Most night photography is going to be about the shutter speed. Lenses with an f/2.8 maximum aperture are essential — and if you can get a prime lens (one that doesn't zoom in and out) with an f/1.8 or f/1.4, they will perform even better in low light.

This is because lenses with a maximum aperture of this size let in the most amount of light, allowing you to use a lower ISO or a faster shutter speed.

In some cases it might seem like the best way to get more light is to use a longer shutter speed, but in cases like astrophotography, there is a limit to the length of the shutter speed that you can use. If you're too slow when capturing the stars, you'll end up capturing the rotation of the earth!

The general rule for the maximum length of an exposure is called the 500 rule, which is where you divide 500 by the focal length of your lens. The answer is the maximum shutter speed that you can use before you start capturing star trails.

That means with a 24mm lens (an ideal starting point for Milky Way photography), you will be able to use a 20-second exposure (500/24=20.83). To learn more about long exposures, you will have to get my Milky Way Photography Secrets ebook by participating in my other events!

Capturing photos of wildlife is all about using a fast shutter speed.
Photo taken by Lea Shields

CAMERA SETTINGS FOR WILDLIFE PHOTOGRAPHY

Like night photography, wildlife photography is all about using the right shutter speed. This is another form of photography where the gear does matter. Professional wildlife photographers will spend up to $15,000 to purchase gigantic, long focal length lenses (think between 400mm and 600mm) with large maximum apertures.

These lenses allow the photographer to take photos from a long distance away so that the wildlife does not notice them — while also allowing them to use as fast of a shutter speed as possible.

Usually you will need to have a shutter speed more than 2x the focal length of your lens (3x if you're using a lens shorter than 200mm). That means if you're using a 600mm lens, you will need a shutter speed that is at least 1/1200 of a second, while a 200mm lens will require a shutter speed of at least 1/600th.

Any slower, and you will start to see some image-ruining motion blur,especially when taking photos of birds in flight, or cases like the image of the bear in the river above.

Squirrels and chipmunks are very fast animals.
They will require a faster shutter speed than

To get fast shutter speeds like this, you will need a lot of light, or a high ISO. But most animals don't come out in the middle of the day, instead preferring to come out around sunset and sunrise to avoid predators. To get a proper shutter speed for wildlife photography, you will have to raise the ISO value up to at least 400, but more often it will be between 800 and 3,200.

When you're using an entry-level camera, these high ISO values can make your photos look grainy and unsharp. This is another case of why most wildlife photographers eventually end up purchasing higher-end cameras and big, expensive lenses that let in more light.

Good wildlife photographers get into the backcountry often. Many of them have jobs that allow them to travel deep into the woods, which gives them more opportunities to experience life around wildlife.

When you're first starting out and seeing if wildlife photography is for you, you can go to local parks that have ponds and try taking bird photos. Every pond will have birds and nice-looking backdrops that are perfect for experimenting with wildlife photography. Face downwind so that birds take off from the branches in your direction, and spend a couple of hours trying to get closer and take better photos. I promise you will fall in love once you start taking tack-sharp images.

Portraits are all about capturing people in surroundings that are meaningful to them.

CAMERA SETTINGS FOR PORTRAITS

The most important setting for portraiture is the aperture. The shutter speed is variable, but needs to be fast enough to stop motion, and the ISO changes depending on your situation.

The primary goal of a portrait is to reduce distractions so that your subject is the center of attention in the photograph. One way to do that is to blur the background using a large aperture value (small f/#). This will also allow you to use a faster shutter speed or a lower ISO — two settings that will make the images cleaner and sharper.

When you want to blur the background, start with the largest aperture that is possible with your lens. When you get closer to your subject with a wide open aperture, you will create the maximum amount of blur possible.

An environmental portrait taken in a Chinese fabric shop.

The biggest camera settings challenge comes when you want to get the background in focus in the case of an environmental portrait. These are images where you show the subject inside their environment — which primarily happens indoors, where there is little light.

Anyone who has tried taking photos of their kids or family with a point and shoot, or entry-level camera during the holidays has dealt with this problem. Using a small aperture to get everything in focus reduces the already small amount of light hitting the sensor, meaning you will need to use a higher ISO or a slower shutter speed to compensate.

When taking environmental portraits, you will have to compensate with low light by either using flash or good natural window lighting.

When you are using a flash, you will need to be aware of the sync speed. Most cameras have a maximum sync speed of 1/160th or 1/200th of a second. When you use shutter speeds that are faster, you will have black bars that show up in your photo because of the physical shutter mechanism blocking the light from the sensor.

If you use a long lens, like 200mm, the flash will be fast enough to freeze the action. So the shutter speed rules for taking sharp photos when hand holding the camera do not apply.

Getting close with a large aperture will help you blur the background like this.

Optical considerations when taking portraits

When taking portraits, you want to make your subject look the best they can. People like portraits where they look their best — and your camera lens makes a big difference.

Wide angle lenses are great for landscape photography, but when you move close to an object, the wide angle lens will distort the image. So when you are taking a portrait, that distortion will make your subject's face look wider and rounder than it will in reality.

The wide angle distortion on cell phone selfie cameras also makes people's noses look up to 30% bigger on their faces, and is the **leading cause of young people getting nose jobs**.

Where possible, your subjects will look their best when using a telephoto focal length. Most portrait photographers swear by using 85mm or 105mm lenses to compress facial features for flattering portraits.

If you're taking an environmental portrait with a wide angle lens, you can avoid the nose-enlarging distortion by simply taking a couple of steps away from your subject.

The choice of lens will of course be dictated by the room you are taking a portrait in, but being aware of the distortion can help you ensure you're taking portraits that people will like.

Sometimes you need to stand in the water to get the right composition.

FINAL THOUGHTS

No one is born with a natural understanding of how a camera works. Once you start using this system and understanding how to use camera settings to create images that are sharp and in focus, you will have overcome the first major hurdle every photographer faces.

After mastering your camera's settings, your photography will change for the better. It takes practice, but the final result is well worth every second.

One of the main lessons in this eBook is to look for ways to let the camera do most of the heavy lifting for you. The less time you spend deciding on the right camera settings, the more time you'll have to focus on the tasks a camera cannot do, like thinking about composition, lighting, and the style of image you want to create.

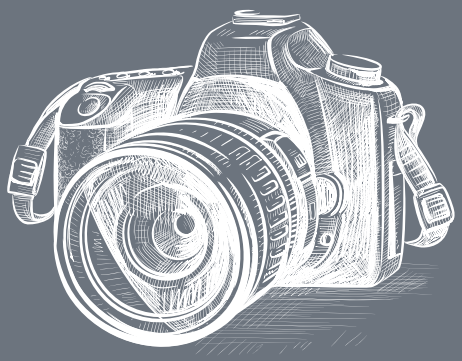
Understanding the settings will also allow you to look at other photographer's work and understand exactly how they got their results. This is called reverse engineering, and it's one of the most powerful techniques to experiment with photography and advance your skills.

Our motto at Photography Academy is ***Explore, Create, Inspire***. When you go out and explore, you'll start creating better photos that will inspire others along the way. This is the adventure of your life. Go out and live it, and take some photos along the way.

Tim Shields
Founder, Photography Academy

P.S., If you liked this book and want to learn my four-step system for taking gallery-worthy photographs, you need to take my **Photography Transformation Masterclass**. I have taught over 10,000 students my simple, repeatable system for taking award-winning photographs with the camera they already own.

How I went from taking terrible photos
to award-winning photos, with the same camera...
by using a new four-step system that you can easily learn!
Take the Free Webclass!
Tim Shields

TIM SHIELDS

Tim Shields is the founder of Photography Academy, the author of The Photo Cookbook, and the creator of the Photography Transformation 4-Step System. He holds the designation of Master Photographer in Fine Art from Master Photographers International.